

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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PUS.

In the course of an exhaustive investigation of suppuration in all its phases, the results of which have been published from time to time during the past few years, JANOWSKI has had occasion to examine pus from a great variety of sources. The facts which he has thus accumulated are brought together in an article entitled "The Morphology of Pus from Various Sources," in a recent number of the *Archiv für experimentelle Pathologie und Pharmakologie*, 1895, xxxvi. 8.

The article embraces the results of the study of pus produced experimentally, as well as that obtained from ordinary suppurative processes in man. Mercury, turpentine, croton oil, creolin, and silver nitrate were found to produce characteristic suppurative lesions in rabbits and dogs when injected subcutaneously, and since in most of these cases the progress of the pus formation was comparatively slow, it was possible to follow the process from step to step with much accuracy. In all of these cases the process was essentially the same. When examined within two or three days after injection of the irritating substance the tissue was found to be infiltrated with small spheroidal cells in every way identical with the mononuclear leucocytes of the blood. There was at this time but little evidence of degenerative change, except where the needle of the syringe had destroyed the tissue. A few days later, however, unmistakable degenerative changes were present. The nuclei of many of the leucocytes had assumed the horseshoe shape, or had already broken into several fragments. Those of others had lost in a measure their power of staining with the ordinary basic dyes; their chromatin seemed to have become less abundant or to have diffused itself throughout the whole cell body, and this last was found to have become diffusely filled with the neutrophile granules of Ehrlich. Usually by this time also a distinct necrotic area had formed about the central purulent mass, in which various stages of degeneration of the tissue elements were readily visible. External to this the tissues were infiltrated with mononuclear leucocytes similar to those which had originally occupied the space which has now become the centre of the abscess.

As the process became older the number of polynuclear cells increased, their cell bodies gradually became larger, and the neutrophile granules little by little disappeared, at first from a portion of the cell protoplasm, then from the whole cell body. At about this time small irregular globules of intensely staining substance appeared in various parts of the cell body and later extracellular. In these cells the nucleus was, for the most part, very indistinct,

and, as the result of careful microchemical tests, Janowski was led to the conclusion that the small globules in question were small masses of chromatin which had been extruded from the nucleus in the course of its degeneration. They were apparently structureless, were irregular in shape, of various sizes, and as many as five or six were present at times in a single cell. Eosinophile leucocytes were almost constantly absent.

Abscesses experimentally produced in dogs by inoculations of the *bacillus typhosus* alone or in association with the staphylococcus pyogenes aureus or streptococcus showed the same transition as that described above as having resulted from injections of chemical irritants. The pus of such abscesses, when examined between the third and seventh days, was composed at first of mononuclear and polynuclear cells, of cells showing "transition" nuclei from mononuclear to polynuclear; later, of polynuclear cells only. In all cases the wall of the abscess contained only mononuclear cells, except in immediate proximity to the older pus. In one of these cases, in which the pus was examined on the fifteenth day, chromatin globules were also present.

Similar appearances were observed in human pus obtained from various sources. In the pus of a perinephritic abscess all the changes were particularly well illustrated. A very few lymphocytes only remained, the majority of the cells being polynuclear neutrophile cells or showing transition nuclei. In a few cells the degeneration had proceeded further, the nuclei had almost disappeared, the neutrophile granules were no longer visible, and in many of these cells there were one or two chromatin masses.

A few eosinophile cells were found in the pus from a small skin abscess in a case of glanders. These cells have been previously described in pus from subcutaneous suppurative processes, and Janowski has also seen them in gonorrhoeal pus; but, with these exceptions, their occurrence in pus is believed to be very unusual.

Chromatin masses were abundant in an actinomycosis suppurative focus of three months' duration; and in the pus from two cases of chronic abscess of the antrum of Highmore leucocytes were no longer discernible, the entire mass being composed of granular debris and chromatin globules of various sizes.

In summing up the results of his investigation, Janowski expresses himself as very decidedly of the belief that in suppurative processes it is the mononuclear leucocyte which leaves the bloodvessels and infiltrates the inflamed tissue, and that the polynuclear cell, so abundant in ripe pus, is derived from this by fragmentation of the nucleus, which, in common with all forms of nuclear multiplication by direct division, must be regarded as degenerative and as evidence of beginning disintegration of the cell. The significance of the neutrophile granulation of the protoplasm is uncertain, but the later disappearance of the granules, the swelling of the cell body, and the appearance of chromatin masses are all regarded as further unmistakable evidence of degeneration.

The rapidity with which these degenerative changes occur varied in different cases, apparently with differences in the cause of the suppurative process in each case. In the pus resulting from chemical irritants they were often more rapid than in that produced by the action of micro-organisms,

complete disintegration of the cells having been most quickly brought about by the action of mercury, creolin, and nitrate of silver.

[The results here recorded, and the inference from them as to the variety of leucocyte which leaves the bloodvessels in suppurative inflammation, are distinctly at variance with the observations of most previous investigators, who have particularly noted the emigration of polynuclear leucocytes, and have also established the fact that in the leucocytosis consequent upon inflammatory conditions it is the polynuclear cells which are especially increased in number. Nevertheless, Janowski may be right in tracing the origin of the polynuclear leucocyte to the lymphocyte, for it is quite possible that in infectious suppurative processes in man the presence of bacterial toxins or of the bacteria themselves in the blood may induce changes in the leucocytes still in the circulation similar to those which Janowski reports as occurring in the leucocytes which have found their way into the tissues. Furthermore, Janowski does not deny the emigration of a few polynuclear leucocytes, and it is universally admitted that some mononuclear leucocytes are always present in the exudate in suppurative inflammation, so that observations which now appear somewhat contradictory may ultimately harmonize. It seems not unlikely that some, at least, of the mononuclear cells described by Janowski as so abundant at the periphery of the abscess may have been young connective-tissue cells whose growth had been stimulated by the proximity of the purulent mass.]

SYPHILIS AND TUBERCULOSIS.

HOCHSINGER reports three cases in which hereditary syphilis and tuberculosis were associated in young children (*Wiener medicin. Blätter*, 1894, No. 20). In all the character of the tubercular lesions was unmistakably shown by the presence in them of the tubercle-bacillus.

In the first case the father was syphilitic, the mother tubercular, and since the child's death occurred on the thirty-first day there seems to be no doubt that the syphilitic infection was spermatric, and that the tubercular was placental.

In the second case there was a marked skin eruption and a clear history of syphilis in one of the parents, but a pneumonic process which had been supposed to be luetic turned out to be tubercular.

In the third child there was tuberculosis of the lungs, lymph nodes, and spleen; syphilis of the liver and of the skin.

It is insisted that the only reliable means of differentiating tubercular and syphilitic lesions in young children is by the discovery of the tubercle-bacillus, and Hochsinger urges a more careful scrutiny in this regard of cheesy masses frequently found in syphilitic children, believing the association of tuberculosis and syphilis to be much less rare than has been heretofore supposed.

We have received from Macmillan & Co. the latest addition to their series of manuals for students in the shape of a handy volume containing the directions for "A Course of Elementary Practical Bacteriology, Including Bacteriological Analysis and Chemistry," by A. A. KANTHACK and J. H. DRYSDALE.

The book covers the course of bacteriology given at St. Bartholomew's Hospital, and is divided into three parts to meet the requirements of the beginner and of more advanced workers.

Part I. comprises general bacteriology, and in it are found directions for the inoculation of culture media, for the staining and study of the morphology and physiology of bacteria in general, and of the more prominent of those pathogenic for man.

Part II. is devoted to bacterial analysis. It includes directions for the preparation of the various culture media, for the bacterial examination of water, milk, air, meat, soil, antiseptics, etc.; for the examination of the body of an animal dead of a bacterial disease, and for the testing of the efficiency of filters.

In Part III. are found general directions as to the various modes of studying the chemistry of the bacteria.

The descriptions of the various processes are explicit and sufficient; the book is of convenient size and is well printed, and should be a useful guide to practical bacteriological work in the laboratory.

HYGIENE AND PUBLIC HEALTH.

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SCHOOLS AND DIPHTHERIA.

That the falling off in the mortality from infectious and preventible diseases, that has been proceeding in England for the last twenty-five years, is the direct effect of the generally improved conditions as regards water-supply, sewerage, drainage, and ventilation under which the mass of the population live, in consequence of successive Public Health Acts and others for the housing of the working classes, the notification, etc., of infectious diseases, Building Acts, and the like, is clear from the fact that it is most marked in those which, like enteric fever and diarrhoea, are dependent on filth and polluted water supplies; phthisis, favored by damp sites and ill-ventilated houses and workshops; scarlatina, in which the facilities now afforded for isolation in fever hospitals, and the prompt disinfection of the houses by the local sanitary authorities, contribute to the suppression of the outbreaks.

But diphtheria, which, originating in insanitary conditions and spread by personal contact and intercourse, holds a place midway between, or rather partakes of the characters of enteric and scarlet fevers, shows a tendency to